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GLOSSARY

Terms*

Alongshore

Parallel to and near the shoreline.

Amplitude, Wave

The magnitude of the displacement of a wave from a mean value.

Annual Series

A data set in which each item in the set is the maximum water level recorded in a year.

Attenuation

A decrease of wave amplitude with distance from the origin.

Bathymetry

The measurement of depths of water in oceans, seas, tidal areas and other water bodies, also information derived from such measurements.

Beach

The zone of unconsolidated material that extends landward from the low water line to the place where there is marked change in material or physiographic form, or to the line of permanent vegetation (usually the effective limit of storm waves). The seaward limit of a beach--unless otherwise specified--is the mean low water line.

*A number of the terms given herein were extracted from Volume III of the Shore Protection Manual (1984), prepared by the Coastal Engineering Research Center, and Bulletin No. 17b (1982), prepared by the Interagency Advisory Committee on Water Data.

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Bench Mark

A permanently fixed point of known elevation. A primary bench mark is one close to a tide station to which the tide staff and tidal datum originally are referenced.

Bottom

The ground or bed under any body of water; the bottom of the sea or seabed.

Breaker Depth or Breaking Depth

A stillwater depth at the point where a wave breaks. (Approximately equal to 1.3 times the wave height.)

Breakwater

A structure protecting a shore area, harbor, anchorage, or basin from waves.

Broken Record

A systematic record which is divided into separate continuous segments because of discontinuation of water level recordings during a certain span of time.

Calibration, Mathematical Model

A hindcast study performed for the purpose of adjusting the model (usually via bottom friction) to obtain reasonable agreement between the calculated and observed water motions.

Central Pressure Index (CPI)

The estimated minimum barometric pressure in the eye (approximate center) of a particular hurricane. The CPI is considered the most stable index to intensity of hurricane wind velocities in the periphery of the storm; the highest wind speeds are associated with storms having the lowest CPI.

Coast

A strip of land of indefinite width (may be several miles) that extends from the shoreline inland to the first major change in terrain features.

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Coastal Area

The land and sea area bordering the shoreline.

Coastal Plain

The plain composed of horizontal or gently sloping strata of clastic materials fronting the coast, and generally representing a strip of sea bottom that has emerged from the sea in recent geologic time.

Coastline

(1) Technically, the line that forms the boundary between the coast and the shore. (2) Commonly, the line that forms the boundary between the land and the water.

Coefficient of Skewness

A numerical measure or index of the lack of symmetry in a frequency distribution. Function of the third moment of magnitudes about their mean, a measure of asymmetry. Also called "coefficient of skew" or "skew coefficient."

Confidence Limits

Computed values on both sides of an estimate of a parameter that show, for a specified probability, the range in which the true value of the parameter lies.

Continental Shelf

The zone bordering a continent and extending from the low water line to the depth (usually about 100 fathoms) where there is a marked or rather steep descent toward a greater depth.

Contour

A line on a map or chart connecting points of equal elevation with relation to a datum. It is called an isobath when connecting points of equal depth below a datum.

Datum Plane

The horizontal plane to which soundings, ground elevations, or water surface elevations are referred. The plane is called a Tidel

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Datum when defined by a certain phase of the tide. The datum used in this manual is the National Geodetic Vertical Datum of 1929, formerly referred to as the Mean Sea Level Datum.

Debris Line

A line near the limit of storm wave uprush marking the landward limit of debris deposits.

Deep Water

Water so deep that surface waves are little affected by the ocean bottom. Generally, water deeper than one-half the surface wavelength is considered deep water.

Delta

An alluvial deposit, roughly triangular or digitate in shape, formed at a river mouth.

Depth

The vertical distance from a specified datum to the sea floor.

Depth of Breaking

The stillwater depth at the point where the wave breaks. Also see Breaker Depth.

Depth Contour

See Contour.

Design Hurricane

See Hypothetical Hurricane.

Embayment

An indentation in the shoreline forming an open bay.

Estuary

(1) The part of a river that is affected by tides. (2) The region near a river mouth in which the fresh water of the river mixes with the salt water of the sea.

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Exceedence Frequency

The percentage of values that exceed a specified magnitude, 100 times exceedence probability.

Exceedence Probability

Probability that a random event will exceed a specified magnitude in a given time period, usually one year.

Expected Probability

The average of the true probabilities of all magnitude estimates for any specified coastal flood frequency that might be made from successive samples of a specified size.

Eye

In meteorology, usually the "eye of the storm" (hurricane); the roughly circular area of comparatively light winds and fair weather found at the center of a severe tropical cyclone.

Fetch

The area in which Seas are generated by a wind having a rather constant direction and speed. Sometimes used synonymously with Fetch Length.

Fetch Length

The horizontal distance (in the direction of the wind) over which a wind generates Seas or creates a Wind Setup.

Forerunner

Low, long-period ocean Swell which precedes the main swell from a distant storm, especially a tropical cyclone. The forerunner surge commonly occurs in the Gulf of Mexico.

Forward Speed (Hurricane)

Rate of movement (propagation) or translation speed of the hurricane eye.

Frequency Distribution

Function describing the relative frequency with which events of various magnitudes occur.

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Gravity Wave

A wave in which the velocity of propagation is controlled primarily by gravity. Water waves more than 2 inches long are considered gravity waves.

Groin (British, Groyne)

A shore protection structure built (usually perpendicular to the shoreline) to trap littoral drift or retard erosion of the shore.

Grid, Mathematical Modeling

A network of lines or mesh points that is used to discretize a given study area.

High Water Mark

A discoloration or debris line resulting from flood water.

Hurricane

An intense tropical cyclone in which winds tend to spiral inward toward a core of low pressure, with maximum surface wind velocities that equal or exceed 75 mph (65 knots) for several minutes or longer at some points.

Hurricane Path or Track

Line of movement (propagation) of the eye through an area.

Hurricane Stage Hydrograph

A continuous graph representing water level stages that would be recorded in a gage well located at a specified point of interest during the passage of a particular hurricane, assuming the effects of relatively short-period waves are eliminated from the record by damping features of the gage well. Unless specifically excluded and separately accounted for, hurricane surge hydrographs are assumed to include effects of astronomical tides, barometric pressure differences, and all other factors that influence water level stages within a properly designed gage well located at a specified point.

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Hurricane Surge Hydrograph

A continuous graph representing the difference between the hurricane stage hydrograph and the water stage hydrograph that would have prevailed at the same point and time if the hurricane had not occurred.

Hurricane Wind Pattern or Isovel Patterns

An actual or graphical representation of near-surface wind velocities covering the entire area of a hurricane at a particular instant. Isovels are lines connecting points of simultaneous equal wind velocities, usually referenced to a level 10 meters or about 33 feet above the surface, in knots or mph; wind directions at various points are indicated by arrows or deflection angles on the isovel charts. Isovel charts are usually prepared at each hour during a hurricane, but for each half-hour during critical periods.

Hydrography

(1) A configuration of an underwater surface including its relief, bottom materials, coastal structures, etc. (2) The description and study of seas, lakes, rivers, and other waters.

Hypothetical Hurricane ("Hypo-Hurricane")

A representation of a hurricane, with specified characteristics, that is assumed to occur in a particular study area, following a specified path and timing sequence.

a. Transposed. A hypo-hurricane based on the storm transposition principle is assumed to have wind patterns and other characteristics basically comparable to a specified hurricane of record, but is transposed to follow a new path to serve as a basis for computing a hurricane surge hydrograph that would be expected at a selected point. Moderate adjustments in timing or rate of forward movement may be made also, if these are compatible with meteorological considerations and study objectives.

b. Hypo-Hurricane Based on Generalized Parameters. Hypo-hurricane estimates based on various logical combinations of hurricane characteristics used in estimating hurricane surge

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magnitudes corresponding to a range of probabilities and potentialities. The Standard Project Hurricane (SPH) is most commonly used for this purpose, but estimates corresponding to more severe or less severe assumptions are important in some project investigations.

c. Standard Project Hurricane (SPH). A hypothetical hurricane intended to represent the most severe combination of hurricane parameters that is reasonable characteristic of a specified region, excluding extremely rare combinations. It is further assumed that the SPH would approach a given project site from such direction, and at such rate of movement as to produce the highest hurricane surge hydrograph, considering pertinent hydraulic characteristics of the area. Based on this concept, and extensive meteorological studies and probability analyses, a tabulation of "Standard Project Hurricane Index Characteristics" mutually agreed upon by representatives of the U. S. Weather Bureau and the Corps of Engineers, is available.

d. Probable Maximum Hurricane (PMH). A hypo-hurricane that might result from the most severe combination of hurricane parameters that is considered reasonably possible in the region involved, if the hurricane should approach the point under study along a critical path and at optimum rate of movement. This estimate is substantially more severe than the SPH criteria.

e. Design Hurricane. A representation of a hurricane with specified characteristics that would produce hurricane surge hydrographs and coincident wave effects at various key locations along a proposed project alignment. It governs the project design after economics and other factors have been duly considered. The design hurricane may be more or less severe than the SPH, depending on economics, risk, and local considerations.

Hydraulic Model

A physical or numerical replica of a real system that is constructed or developed for the purpose of simulating water motions.

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a. Physical Model. A small scale (length scale usually distorted) version of the prototype that is constructed with concrete or other materials.

b. Mathematical Model. A numerical representation of the prototype with direct correspondence in scale in which the solid boundary is described at discrete locations.

Incomplete Record

A record in which one or more maximum water levels are missing due to gage failure.

Initial Conditions, Mathematical Modeling

The flows and elevations of the water surface within a modeled area at the time calculations are begun. These conditions are usually imposed by taking the system in equilibrium state or based on the flows and elevations determined from previous measurements or calculations.

Jetty

(1) (U. S. usage) On open seacoasts, a structure extending into a body of water designed to prevent shoaling of a channel by littoral materials, and to direct and confine the stream or tidal flow. Jetties are built at the mouth of a river or tidal inlet to help deepen and stabilize a channel. (2) (British usage) Jetty is synonymous with "wharf" or "pier."

Knot

The unit of speed used in navigation. It is equal to 1 nautical mile (6,076.115 feet or 1,852 meters) per hour.

Lee

(1) Shelter, the part or side sheltered, or turned away from the wind/waves. (2) (Chiefly nautical) The quarter or region toward which the wind blows.

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Leeward

The direction toward which the wind is blowing; the direction toward which waves are traveling.

Length of Wave

The horizontal distance between similar points on two successive waves measured perpendicularly to the crest.

Levee

A dike or embankment to protect land from inundation.

Level of Significance

The probability of rejecting a hypothesis when in fact it should be accepted. If, for example, a .05 or 5% level of significance is chosen in designing a test of hypothesis, then there are about 5 chances in 100 that the hypothesis will be rejected when it should be accepted. Thus by accepting the hypothesis, one may be about 95% confident that the right decision was made.

Longshore

Parallel to and near the shoreline.

Mathematical Model

See Hydraulic Model.

Method of Moments

A standard statistical computation for estimating the moment of a distribution from the data of a sample.

Modeled Area

The area delineated for a mathematical model study.

Nautical Mile

The length of a minute of arc, $1/21,600$ of an average great circle of the earth. Generally one minute of latitude is considered equal to one nautical mile. The accepted United States value as of 1 July 1959 is 6,076.115 feet or 1,852 meters, approximately 1.15 times as long as the statute mile of 5,280 feet.

Normal Distribution

A probability distribution that is symmetrical about the mean, median, and mode (bell shaped). It is the most studied distribution in statistics, even though most data are not exactly normally distributed, because of its value in theoretical work and because many other distributions can be transformed into normal. It is also known as Gaussian, Laplacean, Gauss-Laplace, or Laplace-Gauss distribution. In addition, it is sometimes referred to as the Second Law of Laplace.

Offshore

(1) In beach terminology, the comparatively flat zone of variable width, extending from the breaker zone to the seaward edge of the Continental Shelf. (2) A direction seaward from the shore.

Onshore

A direction landward from the sea.

Onshore Wind

A wind blowing landward from the sea.

Oscillation

A periodic motion that fluctuates between maximum and minimum values about a mean value.

Oscillatory Wave

A wave in which each individual particle oscillates about a point with little or no change in permanent position. The term is commonly applied to progressive oscillatory waves in which the form advances, but the individual particles move in closed or nearly closed orbits.

Outlier

Data points which depart significantly from the trend of the remaining data.

Percent Chance

A probability multiplied by 100.

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Population

A statistical term which refers to the entire set of events (past and future) for a particular phenomenon.

Propagation of Waves

The transmission of waves through water.

Prototype

In laboratory usage, the full-scale structure, concept, or phenomenon used as a basis for constructing a scale model or copy.

Radius of Maximum Winds

Distance from the eye of a hurricane to the region where surface wind speeds are maximum.

Refraction (of Water Waves)

(1) The process by which the direction of a wave, moving in shallow water at an angle to the contours, is changed. The part of the wave advancing in shallower water moves more slowly than that part still advancing in deeper water, causing the wave crest to bend toward alignment with the underwater contours. (2) The bending of wave crests by currents.

Runup

The rush of water up a structure or beach on the breaking of a wave. The amount of runup is the vertical height above still water level that the rush of water reaches.

Sample

A statistical term which refers to a part or fragment of the population.

Seiche

(1) A standing wave oscillation of an enclosed water body that continues, pendulum fashion, after the cessation of the originating force, which may have been either seismic or atmospheric. (2) An oscillation of a fluid body in response to a disturbing force having the same frequency as the natural frequency of the fluid system.

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Tides are now considered to be seiches induced primarily by the periodic forces caused by the sun and moon.

Seismic Sea Wave (Tsunami)

A long period wave caused by an underwater seismic disturbance or volcanic eruption. Commonly misnamed "tidal wave".

Setup, Wave

Superelevation of the water surface over normal surge elevation due to onshore mass transport of the water by wave action along.

Shallow Water

(1) Commonly, water of such depth that surface waves are noticeably affected by bottom topography. It is customary to consider water of depths less than one-half the surface wavelength as shallow water. (2) More strictly, in hydrodynamics with regard to progressive gravity waves, water in which the depth is less than $1/25$ the wave length.

Shoal (noun)

A detached elevation of the sea bottom, comprised of any material except rock or coral, which may endanger surface navigation.

Shoal (verb)

(1) To become shallow gradually. (2) To cause to become shallow. (3) To proceed from a greater to a lesser depth of water.

Shore

The narrow strip of land in immediate contact with the sea, including the zone between high and low water lines. A shore of unconsolidated material is usually called a beach.

Shoreface

The narrow zone seaward from the low tide shoreline covered by water over which the beach sands and gravels actively oscillate with changing wave conditions.

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Shoreline

The intersection of a specified plane of water with the shore or beach. (e.g., the highwater shoreline would be the intersection of the plane of mean high water with the shore or beach). The line delineating the shoreline on U.S. Coast and Geodetic Survey nautical charts and surveys approximates the mean high water line.

Significant Wave

A statistical term relating to the one-third highest waves of a given wave group and defined by the average of their heights and periods. The composition of the higher waves depends upon the extent to which the lower waves are considered. Experience indicates that a careful observer who attempts to establish the character of the higher waves will record values which approximately fit the definition of the significant wave.

Significant Wave Height

The average height of the one-third highest waves of a given wave group. Note that the composition of the highest waves depends upon the extent to which the lower waves are considered. In wave record analysis, the average height of the highest one-third of a selected number of waves, this number being determined by dividing the time of record by significant period.

Significant Wave Period

A statistical period taken as the average period of the one-third highest waves within a given group. Note that the composition of the highest waves depends upon the extent to which the lower waves are considered. In wave record analysis, this is determined as the average period of the most frequently recurring of the larger well defined waves in the record under study.

Skew Coefficient

See Coefficient of Skewness.

Slack Tide (Slack Water)

The state of tidal current when its velocity is near zero,

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especially the moment when a reversing current changes direction and its velocity is zero. Sometimes considered the intermediate period between ebb and flood currents during which the velocity of the currents is less than 0.1 knot.

Standard Deviation

A measure of the dispersion or precision of a series of statistical values. It is the square root of the sum of squares of the deviations from the arithmetic mean divided by the number of values or events in the series. It is now standard practice in statistics to divide by the number of values minus one in order to obtain an unbiased estimate of the variance from the sample data.

Standard Project Hurricane

See Hypothetical Hurricane.

Stillwater Level

The elevation that the surface of the water would assume if all wave action were absent.

Storm Surge

A rise or possible fall of the normal water level in coastal waters due to the interaction between a storm and the underlying water.

Tide

The periodic rising and falling of the water that results from gravitation attraction of the moon and sun and other astronomical bodies acting upon the rotating earth. Although the accompanying horizontal movement of the water resulting from the same cause is also sometimes called the tide, it is preferable to designate the latter as Tidal Current, reserving the name Tide for the vertical movement.

Topography

The configuration of a surface, including its relief, the position of its streams, roads, buildings, etc.

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Tropical Cyclone

See Hurricane.

Tropical Storm

(1) An atmospheric disturbance which originates in the tropics. (2)
A storm with maximum winds less than 75 mph.

Tsunami

A long-period wave caused by an underwater disturbance such as a volcanic eruption or earthquake. Commonly misnamed "tidal wave."

Typhoon

See Hurricane.

Verification, Mathematical Models

A hindcast study performed subsequent to model calibration for the purpose of verifying that the model will give a reasonable reproduction of water motions.

Viscosity (or internal friction)

That molecular property of a fluid that enables it to support tangential stresses for a finite time and thus to resist deformation.

Wave Direction

The direction from which a wave approaches.

Wave Forecasting

The theoretical determination of future wave characteristics, usually from observed or predicted meteorological phenomena.

Wave Group

A series of waves in which the wave direction, wavelength, and wave height vary only slightly.

Wavelength

The horizontal distance between similar points on two successive waves measured perpendicular to the crest.

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Wave Refraction

See Refraction of water waves.

Wave Setup

See Setup, Wave.

Wave Spectrum

In ocean wave studies, a graph, table, or mathematical equation showing the distribution of wave energy as a function of wave frequency. The spectrum may be based on observation or theoretical considerations. Several forms of graphical display are widely used.

Wave Steepness

The ratio of the wave height to the wavelength.

Wave Train

A series of waves from the same direction.

Wave of Translation

The wave in which the water particles are permanently displaced to a significant degree in the direction of wave travel. Distinguished from an Oscillatory Wave.

Wave Trough

The lowest part of a wave form between successive crests. Also that part of a wave below stillwater level.

Windward

The direction from which the wind is blowing.

Wind Waves

(1) Waves being formed and built up by the wind. (2) Loosely, any wave generated by wind.